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Mismatch Between Medication Intake and Refill: Validation of the Traditional Chinese Version of the Adherence to Refills and Medications Scale among Adults with Type 2 Diabetes

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Background: The Adherence to Refills and Medications Scale (ARMS) is a commonly used tool for assessing medication adherence. Besides evaluating adherence to taking medications, the ARMS identifies potential challenges in filling or refilling prescriptions. Despite its widespread use, the ARMS has yet to be validated for patients who read Traditional Chinese.

Purpose: This study translated and validated the Traditional Chinese version of the ARMS (ChARMS-T) and explored common barriers to medication adherence among individuals with type 2 diabetes (T2D) in Taiwan.

Method: The ChARMS-T was developed in translation and application phases. In the translation phase, the scale underwent forward and backward translation, followed by cognitive debriefing. In the application phase, the finalized ChARMS-T was administered to participants at five community pharmacies in Taiwan over a nine-month period beginning in September 2023. Eligible participants were adults of 18 years or older, diagnosed with T2D, prescribed at least one oral diabetes medication, and able to read Traditional Chinese. The psychometric evaluation included assessing criterion validity, construct validity via confirmatory factor analysis, and reliability using McDonald's ω .

Findings: Three hundred and forty-three patients participated in the study.

Confirmatory factor analysis revealed a two-factor structure for the 12-item ChARMS-T, which includes the domains of medication-taking (8 items) and medication refill (4 items). The internal consistency reliability of the instrument was found to be acceptable, with McDonald's ω scores of 0.841 for medication-taking and 0.647 for medication refill. The medication refill subscale demonstrated strong agreement with the objective refill measure, the proportion of days covered, yielding a coefficient of 0.86. Evidence of known-groups validity was established by a significant difference between ChARMS-T scores and glycemic control ($p = 0.047$). Patients with good glycemic control exhibited a significantly higher adherence rate for both medication refills and medication-taking than those with poor glycemic control. The most frequently reported barriers to medication-taking included carelessness (55.7%, $n = 191$), forgetfulness (54.8%, $n = 188$), and frequent dosing intervals (43.1%, $n = 148$). Regarding medication refills, 33 participants (9.6%) cited a lack of planning as the primary reason for

not refilling their diabetes medications on time, followed by forgetfulness (7.6%, $n = 26$).

Conclusion: The ChARMS-T uncovered a wider variety of reasons for non-adherence and showed satisfactory psychometric properties. It can be incorporated into clinical practice for screening and follow-up. This approach promotes effective communication between healthcare professionals and patients, thereby enhancing medication adherence and improving long-term patient health outcomes.

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Evaluating Large language models in Identifying and Addressing Drug-Related Problems: Clinical Pharmacists' Perspectives on ChatGPT's Accuracy

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Background: Artificial intelligence (AI) incorporates aspects of human intelligence, including reasoning, problem-solving, planning, learning, responsiveness, comprehension, and language generation, and includes fields like natural language processing (NLP). Large Language Models (LLMs), a subset of NLP, are specifically designed to understand and produce human language. Given these capabilities, LLMs hold potential for use in pharmaceutical cognitive services, such as medication reviews.

Purpose: The purpose of this study was to evaluate the effectiveness of LLM in identifying and addressing drug-related problems. The study focused on clinical pharmacists' perspectives regarding the accuracy, clarity, comprehensiveness, linguistic precision, and reasoning of LLM-generated responses to presented clinical cases, as well as their overall attitudes toward AI's role in clinical settings.

Method: To achieve these objectives, we designed five clinical cases featuring patients with various conditions and prescribed medications. Each case included two general questions and six to ten specific questions. General questions assessed whether LLM could independently recognize drug-related issues and suggest relevant actions without prompting, while specific questions targeted particular therapeutic areas. Given its capabilities, ChatGPT was selected as the LLM tool for this study. ChatGPT was presented with each case in Slovenian language and associated questions, and clinical pharmacists evaluated its responses using a Likert scale (1 to 5) across five criteria: accuracy, clarity, comprehensiveness, linguistic quality, and reasoning. Each case was reviewed by two clinical pharmacists to ensure reliability. To further explore pharmacists' perspectives, five additional questions assessed their attitudes toward AI in clinical practice.

Findings: The results indicate that ChatGPT's accuracy was similar across general and specific questions, with an average rating of 3.40 for general questions and 3.17 for specific ones. ChatGPT demonstrated solid knowledge of active ingredients, such as indications, dosages, and adverse effects, but struggled with